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Community-oriented landscape design for sustainability in architecture and planning

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Abstract

Sustainable design has a lot to do with society, economy and environment's principles, and these elements should be considered in design process. Social aspects of sustainability, is in need of community participation. Participation in the design process especially in landscape architecture and design is one of the most important factors which are emphasized in recent years and new theories.The paper is to propose a systematic guideline to find community needs and demands in order to develop a community-oriented landscape design. This model developed to meet sustainability in architecture and planning, which is examined in case of Iran, Tehran, Majid-Abad Park.

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Keywords: community-oriented; landscape design; sustainable design;customers' needs; customer satisfaction; majid-abad park

1. INTRODUCTION

The urban outdoor spaces have exceptional environmental importance with regard to their contribution to the reduction of various types of pollution and to the improvement of microclimatic conditions. Furthermore, urban open spaces make positive contributions to human health and well being and they lead to an important contribution to human thermal comfort in exterior spaces [1]. Beside aesthetic, psychological and health benefits, natural features in cities can have other social benefits [2]. Aspects such as “amount of public green spaces per inhabitant”, “public parks” and “recreation areas” are often mentioned as important factors to make the city liveable, pleasant and attractive for its citizens. It is strongly believed that developing more sustainable cities is not just about improving the abiotic and biotic aspects of urban life, it is also about the social aspects of city life, that is—among others—about people’s

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satisfaction, experiences and perceptions of the quality of their everyday environments [3]. So a good strategy for a sustainable landscape development should not only focus on sustaining the physical landscape resources, but it should also and perhaps most of all guarantee that the residents can participate in the landscape development [4]. Sustainability indicators for urban development should include more parameters about public spaces and green open areas, as well as indexes reflecting citizens' satisfaction and perception of their living environments [3]. This paper direct to the importance of urban parks for the well being of the citizens and for the sustainability of the city they live in.

2. Literature Review

2.1. Community and Advantages of Participation

Concepts such as 'community' and 'community participation' have been intensively problematized in recent decades in both developed and developing countries. Contexts are indeed different and varied [5]. The word 'community' is an umbrella term that is defined and applied in a myriad of ways [6].

Citizen participation is, however, a lot more than just consulting people for the successful resolution of social, cultural and economic issues related to environmental conflicts. The primary goal of participation is to give proper responsibility to people for, and control over, their lives [7]. The importance of community participation has been emphasized in the 5th Development Plan of Islamic Republic of Iran that highlighted the necessity community-oriented approaches, especially in landscape architecture.

2.2. Participation in Process Design

- 2.2.1. *Process Design*

To produce an object-design and, as far as necessary, a realization design, one may want to design the design process itself. However, as in the realization process, in many cases already some kind of design process may be in place. Experienced individual architectural or engineering designers, or small teams of them, tend to use informal procedures for their design processes, which they have developed over time through their initial professional training and through subsequent experimenting and learning…Professionalization of process design has progressed much less than in object and realization design. As we will see this may be related to the fact that in object and realization design one designs respectively material objects and processes with strong material elements, while in process design one designs human action systems, which are of a fundamentally different nature [8].

- 2.2.2. Importance of User's Participation in Process Design

Armstrong (1993) observed that the individual has a natural claim to participate in decision making related to his/her situation with both psychological and social needs to feel control over his or her own life conditions. He explains that decisions become better when the persons who are affected become a part of the decision making process [9]. if one longs for decision making and esteems the design of expert and participative technical solutions over those designed through , object and realization design, the technical/ participative approach is likely to be used. Main stages of the design process can comes into account a general decide model Identify, design, selection, implementation and evaluation of environment are the main stages of the design process, see figure 1.

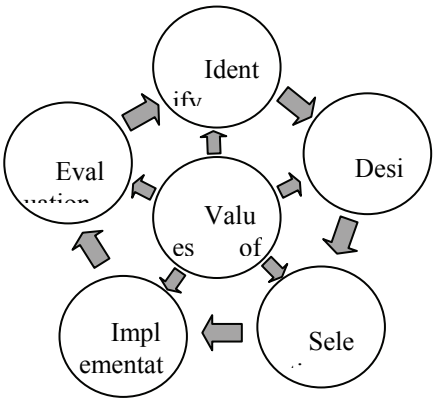

Fig. 1. General model for designing practical procedure

2.3. Quality Function Deployment

- 2.3.1. The Process of QFD

Quality function deployment (QFD) is ‘‘an overall concept that provides a means of translating customer requirements into the appropriate technical requirements for each stage of product development and production [10]. In the 1960s, Quality Control and Quality Improvement had a distinctively manufacturing flavor in Japan. . . . In the late 1960s and early 1970s, Joji [Yoji] Akao and others went to work on improving the design process so that when the new product was introduced to manufacturing, it was high quality from the beginning. The process for improving design was called Quality Function Deployment (QFD). From 1975 to 1995, this tool/process was integrated with other improvement tools to generate a mosaic of opportunities for product developers [11]. Since its initial development in Japan in the late 1960s and early 1970s, especially since its rapidly spreading to the US in the 1980s and later to many industries in many nations, a vast literature on QFD has evolved. To suit the different needs of QFD researchers and practitioners, its literature needs categorizing and reviewing. This is a meaningful but difficult work that seems having not been done yet[12].

- 2.3.2. QFD Applications in Process Design Literature Review

There is no definite boundary for QFD’s potential fields of applications And the interests in QFD applications in process design are growing slowly. Various applications within the literature can be grouped under three categories as: QFD implementations before the design process; QFD implementations during the design process and QFD implementations after the design process.

- 2.3.3. QFD Implementations before the Design Process

QFD was originally proposed, through collecting and analyzing the voice of the customer, to develop products with higher quality to meet or surpass customer’s needs. Thus, the primary functions of QFD are product development, quality management, and customer needs analysis. Quality management and product development are achieved in QFD through customer needs analysis that, in fact, is always the very first step of a QFD process and is thus an important functional field of QFD [13].

- 2.3.4. QFD Implementation during the Design Process

QFD is not a design technique. It is a method from design process to satisfy the customer. It is to guide the design process and to transform customer requirements into design objectives. It is applied to evaluate design solutions or outputs from the creative process of design.

- 2.3.5. QFD implementations after the design process

QFD is a pro-active ‘‘customer-driven planning process’’ so that problems could be found and solved at the very beginning of the product development and fewer people have to deal with the problems at the

later stages [14].

3. Inference Mechanism

3.1. Research Tools

QFD offers a rationalized approach to customer satisfactions and seems complex and mathematical with too many data. For some landscape design, it's not easy to define the average customer, and also customers may not know all possibilities. In the first part of present study, the design team prepared the engineering characteristics that would enable a set of predefined customer needs regarding the comfort and improving product performance. Next, the design team used the House of Quality to establish the mutual relations between the customer needs and the engineering characteristics.

3.2. Research Question and Research Method

How a customer-oriented approach toward landscape design may be established? Qualitative Research Method is adopted in this paper which being supported by depth interview technique with questionnaire[15].

4. Case Study: QFD application in A Customer-Oriented Approach Toward Landscape Design

4.1. Police Park

The case study covers a QFD exercise carried out by research team of landscape architecture students of Tarbiat Modares University in the case of Iran, Tehran, Police Park. Police Park is located in the region called the Garden of Majid Abad in the North East area of Tehran and total area is about 42 hectares. Since its completion in 2003, it has become the most popular park in the city. This park split to northern and southern section by Street. We will remember to North Majid-Abad Park and South Majid-Abad Park in this paper. The purpose of this research is employing qualitative techniques to develop performance quality in neighborhood parks design. In this regard, North Majid-Abad Park has been selected as samples and South Majid-Abad Park as rival Park in computing and data collection in the field is considered, Figure 2.

Fig. 2. North Majid-Abad Park and South Majid-Abad Park

4.2. Constructing the HOQ Matrix

- A difficult and demanding part of the systems engineering process is definition of the problem and identification of the needs to the system. QFD is related to systems engineering in terms of facilitating specification of stakeholders' wants and needs to the system at each stage from research and product

development to engineering and manufacturing, to marketing and distribution. QFD is a method that structures system planning and development, and enables the development team to assess the proposed system systematically in terms of how it meets the needs and requirements [16].

- As stated before, the first step in the application is to identify the expectations of park users. To achieve this purpose, Several methods can be used to establish customers' expectations: survey, interviews; questionnaires; observation, etc. A pilot questionnaire survey was made based on literature review and observation, and it was given to 36 park users. The final survey questionnaire was modified based on the pilot study. Results of customer surveys, interviews with park users have constituted the entries of HOQ. The determined customer requirements are presented in five major factors in Table 1.
- Access and connection: Customers expect to easily communicate with their desired location have physical and visual.
- Safety: feeling of security and having a good mental image of the environment.
- Health: To minimize air pollution, sound pollution and….
- Sociability: the citizens are able to place and person should own
- Vitality: the concept of allowing the survival of human biological and sociological

Table 1. Voice of customers section of HOQ

factors	Access and connection	**1.** Having continuity directions **2.** Having connections to both directions **3.** Legibility Directions **4.** Walk around the paths being
	safety	**5.** Tangible and non tangible Care **6.** Proper lighting at night
	Health	**7.** Health Rates
	Sociability	**8.** participative
	Vitality	**9.** Economic vitality **10.** retail sales

- The technical specifications corresponding to each voice of customer have been identified in the next step. Technical specifications reflect the solutions selected by the research team to supply the customers and translate the quality functions to design features. The technical specifications should be measurable and quantitative to allow them to be compared with objectives. Technical specifications, which have been identified as a result of brain storming sessions consist of Quality Function Development team consists of a number of landscape design students, are listed in Table2.

Table 2. Technical measures section of HOQ

1.	Number of directions without deadlock
2.	Number of Intersection
3.	Number of signpost
4.	Number of pedestrian direction
5.	Number of centers and individuals to care for
6.	Number of lighting equipment

7.	Number of health service equipment
8.	Number of places and social gathering places
9.	Number of business units
10.	Number of retail sales

- The process of QFD involves many steps of one or more interlinked matrix to follow, of which the first is called ‘‘House of Quality’’ (HOQ). In this phase, customer requirements are identified (‘‘whats’’) and then the requirements are transformed into technical responses or specifications (‘‘hows’’). The HOQ displays the Voice of the Customer along the left, and the development team’s technical specifications to the user needs requirements along the top, shown in Figure 4. Based on the weights assigned to the (‘‘whats’’), which are placed to the right in the matrix, the amount of impact each ‘‘how’’ has on achieving each ‘‘what’’ are given priorities written at the bottom of the HOQ.
- The prioritizing of park users requirements is shown in the ‘‘rate importance’’ column in the table, where the values 1-9 may be defined as 1 being least important and 9 of highest importance. The rate of importance and the corresponding explanation derived from the survey.
- In order to fill the relationship section of the HOQ matrix, the relationships between park user requirements and technical specifications have to be specified by the research team. This step is essential to understand the cooperation of each technical specifications in customer satisfaction to see how the technical specifications are helpful to satisfy each customer prospect. The design team estimated the strength of the relationship (9 : strong relationship, 3 : moderate relationship, 1 : weak relationship, or 0 : no relationship) between each customer requirements and each technical specifications are shown in Table 3.

Table 3. Scoring scale

Score	Meaning of relation/linkage
9	Strong relationship
3	Moderate relationship
1	Moderate relationship
0	No relationship

The resulting matrix are shown in Figure 3. The first column, right column after assessment competitors, is called the Goals column. The results of the research team survey ranged from 1 to 5 record in this column. For instance, number 4 in the second row shows designer should plan on connecting directions to assess customer number 3 to number 4 will close. The goals have been set by considering the best alternative for each customer expectation as compared to major rivals. Improvement Ratios for each customer requirements, which are found by dividing the Goal to the current performance, are calculated. For instance, ‘‘Having connections to both directions’’ has an initial importance level of 4. The performance of North Majid-Abad Park in satisfying this need is given a score of 3 whereas the competitors have a corresponding performance score of 4. Thus, the target performance is decided to be 4 and the Improvement Ratio is found by dividing the Goal (4) to the current performance (3). The Improvement Ratio is calculated as 1.33. For Rows the current performance and the Goal are equal, the Improvement Ratios is number 1 that change does not require. The revised weight is obtained by multiplying the Improvement Ratio (1.33) with the original importance weight (4). The purpose of this calculation is to increase the weight of the customer requirements already not considered.

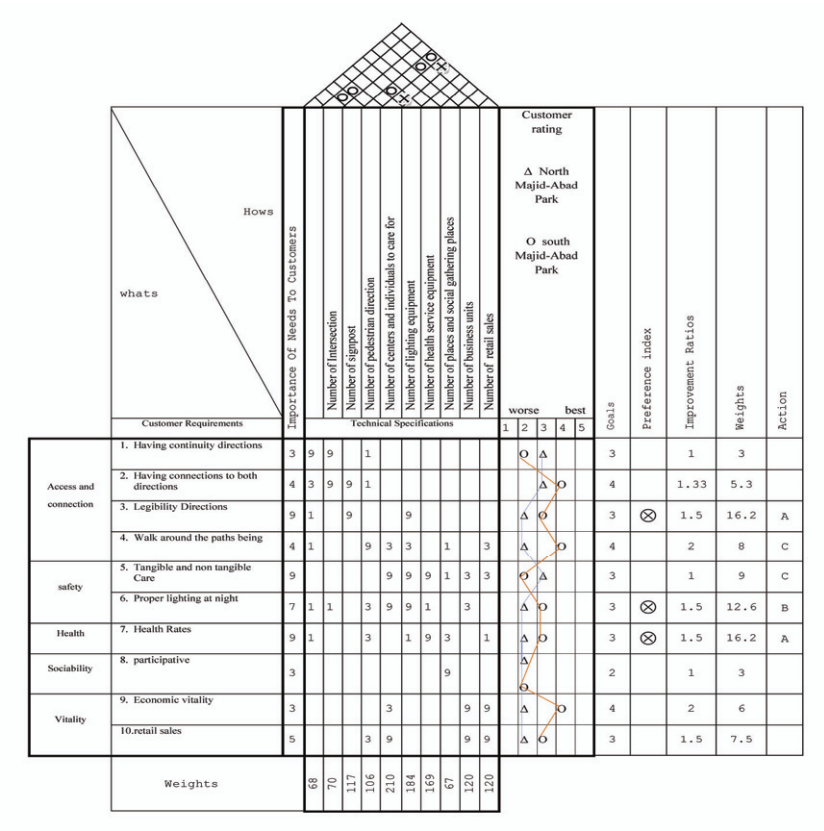

Fig. 3. HOQ matrix

5. DISCUSSION

Actions of A categories will be dedicated to the rows that park designer should evaluate rival (South Majid-Abad Park) and possibly to an imitation of it. Because of customer view, South Majid-Abad Park is in conditions better than North Majid-Abad Park. Actions of B categories shall be adopted in circumstances that South Majid-Abad Park advantage is less than North Majid-Abad Park. We can evaluated along with the South Majid-Abad Park other projects intended to pay them among the best designs can be selected. Actions of AC categories: In these conditions the South Majid-Abad Park and Majid-Abad Park of the North don't have good conditions and better to designer looking for new ideas.

For instance, HOQ shown that, "Legibility Directions" is customer requirements and located in Actions of A categories and possibly to an imitation of South Majid-Abad Park . In the relationship matrix of the HOQ matrix there are the highest the relationship matrix of the HOQ matrix between "Number of signpost" and "Number of lighting equipment" and a medium relationship with "Number of directions without deadlock". The relationship matrix of the HOQ matrix indicate "Number of signpost" technical specifications no negative impact would be on other technical characteristics But there is negative correlation between the " Number of lighting equipment " and " Number of centers and individuals to care for " That is increasing " Number of lighting equipment " from " Number of centers and individuals to care for " is reduced. Designer examining on South Majid-Abad Park a few ideas and test innovative engineering, Legibility Directions according to two technical characteristics increases.

6. CONCLUSION

Quality function deployment (QFD) is a new technique in the field of engineering and a method used to identify critical customer attributes and to create a specific link between customer attributes and design parameters. Our investigations show that the applicability of QFD as a strategic decision-making tool in the field of sustainable design process. The demands of people as the most determining element in design process, may guarantee the success in operation stage. The developed model of QFD is to prioritizing demands and requirements of citizens regarding neighborhood parks. Regarding to the achievements of the paper, the priorities in the column "Row weight" (figure4) are shown.

The results of the investigations indicate that " Legibility Directions ", "health rates" and "tangible and non-tangible care" in the park looking for the most important is customer demands But with the formation of HOQ Matrix and compare North Majid-Abad Park with rival park, the results indicate that "tangible and non tangible care" located in the fourth priority.

Citizen Participation in park design process helps designers to meet the needs of those who will use the park. It also provides citizens of sense of "pride" and "ownership" of the park in all members of the community who participate. These factors help to keep the park alive for many years, and also help to reduce the incidence of vandalism on the parks. Our investigations show that the QFD process is one of the best techniques for Customer-Oriented Approach toward landscape design.

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